

7th Grade Science: Microbes



Indiana Academic Standards:

Science:

- 7.1.5 Identify some important contributions to the advancement of science, mathematics, and technology that have been made by different kinds of people, in different cultures, at different times
- 7.1.9 Explain how societies influence what types of technology are developed and used in such fields as agriculture, manufacturing, sanitation medicine, warfare, transportation, information, processing, and communication.
- 7.1.10 Identify ways that technology has strongly influenced the course of history and continues to do so.
- 7.6..1 Understand and explain that throughout history, people have created explanations for disease. Note that some held that disease had spiritual causes, but that the most persistent biological theory over the centuries was that illness resulted from balance in the body fluids. Realize that the introduction of germ theory by Louis Pasteur and others in the 19th century led to the modern understanding of how many diseases are caused by microorganisms, such as bacteria, viruses, yeast, and parasites.
- 7.6.2 Understand and explain that Louis Pasteur wanted to find out what caused milk and wine to spoil. Note that he demonstrated that spoilage and fermentation occur when microorganisms enter from the air and multiply rapidly, and produce waste products, with some desirable results, such as carbon dioxide in bread dough, and some undesirable, such as acetic acid in wine. Understand that after showing that spoilage could be avoided by keeping germs out or by destroying them with heat, Pasteur investigated animal diseases and showed that microorganisms were involved in many of them. Also note that other investigators later showed that specific kinds of germs caused specific diseases.
- 7.6.3 Understand and explain that Louis Pasteur found that infections by disease organisms (germs) caused the body to build up immunity against subsequent infection by the same organisms. Realize that Pasteur then demonstrated more widely what Edward Jenner had shown for smallpox without understanding the underlying mechanism: that it was possible to produce vaccines that would induce the body to build immunity to a disease without actually causing the disease itself.
- 7.6.4 Understand and describe that changes in health practices have resulted from the acceptance of the germ theory of disease. Realize that before germ theory, illness was treated by appeals to supernatural powers or by trying to adjust body fluids through induced vomiting, bleeding, or purging. Note that the modern approach emphasizes sanitation, the safe handling of food and water, the pasteurization of milk, quarantine, and aseptic surgical techniques to keep germs out of the body; vaccinations to strengthen the body's immune system against subsequent infection by the same kind of microorganisms; and antibiotics and other chemicals and processes to destroy microorganisms.

Language Arts:

2. RDG COMPREHENSION:

Structural Features of Information and Technical Materials:

- ☐ Use the features of informational texts, such as formats, graphics, diagrams, illustrations, charts maps, and organization, to find information and support understanding

Comprehension and Analysis of Grade -Level-Appropriate Text:

- ☐ Recognize main ideas presented in texts, identifying and assessing evidence that supports those ideas

4. WRITING PROCESS

Organization and Focus:

- ☐ Write informational pieces with multiple paragraphs that offer a concluding paragraph that summarizes important ideas and details

Research and Technology:

- ☐ Use note-taking skills

Information Literacy Skills:

(Check all that apply)

- ☐ Standard 1: accesses information efficiently and effectively.
- ☐ Standard 2: evaluates information critically and competently
- ☐ Standard 3: uses information accurately and creatively.
- ☐ Standard 8: practices ethical behavior in regard to information and information technology.
- ☐ Standard 9: participates effectively in groups to pursue and generate information.
- ☐ Standard 10: understands the nature and operation of technology systems.
- ☐ Standard 11: uses a variety of technology tools to enhance learning, increase productivity, promote creativity, and communicate effectively.

Integrated Technologies:

- ☐ Networked computer lab situation
- ☐ Document Camera or Flex Cam
- ☐ Overhead projectors
- ☐ Digital Cameras
- ☐ Video Cameras

Big Idea(s)/Concepts:

(Students will understand that...)

Understanding microbes has led to longer, healthier lives.

Guiding Questions:

(Questions that help us uncover the Big Idea/Concepts)

1. How have people's explanations of diseases changed over time?
2. How have scientific investigations led to increased knowledge of microbes?
3. How has germ theory changed health practices?
4. How have scientific research and technology impacted the human population?

Key Skills and Processes:

Students will know...	Students will be able to...
<ul style="list-style-type: none">• Immunizations and antibiotics fight disease• Louis Pasteur's work was critical to understanding germs• Food preservation technology has changed over time• People have changed their ideas about what causes diseases• Changes in sanitation practices have improved health• It is important to record sources of information	<ul style="list-style-type: none">• Explain the relationships among microbes, disease, immunizations, and antibiotics• Interpret Pasteur's impact on today's health• Explain food preservation technology from a historical perspective.• Create a Works Cited page• Put the information found through research in their own words

Assessment:

(How will students demonstrate their learning?)

Performance Tasks: <i>(Explain, interpret, apply, gain perspectives, demonstrate empathy, extend self-knowledge)</i>	Other Evidence: <i>(Quizzes, tests, homework, etc.)</i>
<ul style="list-style-type: none">• Create a timeline demonstrating important discoveries in the history of microbes.• Compose a short profile of Fleming, Koch, Pasteur, Jenner, Lister, etc. and their impact on public health.• Discuss the implications of modern methods of food preservation (i.e. chemical preservatives, irradiation).• Compare and contrast causes and treatments of a disease from the 1800's to 21st Century.• Write an editorial supporting or refuting future funding for microbe research.• Give an oral multimedia presentation with written evidence of background research and sources• Interpret the connection between germ theory and human population growth	<ul style="list-style-type: none">• Vocabulary quiz• Class presentation• Chapter review• Class participation• Written resource evidence/Works Cited• Audience evaluation quizzes• Oral presentation rubrics• Visual aids rubrics• Timelines

Learning Activities:

(Activities that lead students to The Big Idea(s) and prepare them for performance tasks)

- Use print and electronic resources to research microbes
- Work in small groups to investigate scientific resources
- Previous knowledge chart
- Develop questions
- Use graphic organizers
- Lesson on accessing data via online resources
- Lesson on Boolean searching
- Lesson on documenting sources
- Introduce lesson with picture book YUCK! A Big Book of Little Horrors, Grossology Begins at Home, Magic School Bus in a Pickle or poem
- Extracting information from other students' presentations
- Brainstorm possible KEY WORDS

Resources:

- INSPIRE online databases
- General encyclopedias
- Science encyclopedias
- Online library catalog
- Nonfiction books* (Suggested titles are listed on following page)
- Video sources
- Internet resources

Reflections:

Students: Information Literacy Reflection:

Explain how your driving question(s) guided the research project. As you searched for information, did you modify your questions and/or develop new questions? What impact did this have on your research?

Teacher/ Media Specialist:

(What worked, what didn't?)

Suggested Sources for Microbe Research

- Yearbooks in Science. 1930-1939.
 Yearbooks in Science. 1940-1949.
 Women Inventors
 Food Facts for Young People
 Breakthroughs in Science
 How Did We Find Out About Germs?
 Disease Detectives
 Great Experimenters
 Vaccines: Preventing Disease
 Scientists Behind the Inventors
 Yearbooks in Science. 1980-1989.
 Domestic Technology: A Chronology of Developments
 Invisible Enemies: Stories of Infectious
 The Food Additives Book
 A Virus of Love and Other Tales of Medic
 The New Biotechnology: Putting Microbes
 Yearbooks in Science. 1970-1979.
 Breakthrough: The True Story of Penicillin
 Cold Against Disease
 Yearbooks in Science. 1950-1959.
 Viruses, Life's Smallest Enemies
 Yearbooks in Science. 1900-1919.
 Yearbooks in Science. 1960-1969.
 Diseases: Finding the Cure
 Yearbooks in Science. 1920-1929.
 The Virus Invaders
 Scientists Who Changed the World
 Microbes and Man
 Microorganisms, the Unseen World
 Food Risks and Controversies:
 Yearbooks in Science. 1990 and Beyond.
 The Benefits of Bacteria
 Fighting Infectious Diseases
 Scientists and Discoveries
 A World of Microorganisms

 Encyclopedia of Infectious Diseases

 Eureka!

 The Grolier Library of Science Biographies
 Inventions and Inventors
 Science and Technology Illustrated: The
 Scientists: The Lives and Works of 150
 Scientists. Volume 4, Index to Volumes 1
 World Who's Who in Science: A Biographic
 The World Book Encyclopedia
- Aaseng, Nathan
 Aaseng, Nathan
 Altman, Linda Jacobs
 Arnold, Pauline & White, P
 Asimov, Isaac
 Asimov, Isaac
 Berger, Melvin
 Bixby, William
 Burge, Michael C.
 Burlingame, Roger
 Dunbar, Robert E.
 Duvall, Neil
 Farrell, Jeanette
 Freydberg, Nicholas
 Gregg, Charles T.
 Gross, Cynthia S.
 Gutfreund, Geraldine Mars
 Jacobs, Francine
 Kavalier, Lucy
 Kerby, Mona
 Knight, David C.
 McGowen, Tom
 McGowen, Tom
 Mulcahy, Robert
 Newton, David E.
 Nourse, Alan Edward
 Poole, Lynn
 Postgate, J. R.
 Ricciuti, Edward R.
 Salter, Charles A.
 Silverstein, Herma
 Snedden, Robert
 Snedden, Robert
 Snedden, Robert
 Snedden, Robert

 Turkington, Carol

Group Research Topics

Group 1:

YOUR TOPIC IS FOOD PRESERVATION AND MICROBES. How has food preservation technology changed over time? How has it changed the way people live? Can you share with us any scientists or inventions that influenced the way we preserve food today?

Group 2:

YOUR TOPIC IS VIRUSES. HOW DO THEY WORK: EXAMPLES. How do viruses attack the human body? What type of damage can they cause? Give us some examples of amazing viruses, how we fight them and the damage they do.

Group 3:

YOUR TOPIC IS IMMUNIZATIONS (VACCINES) AND THE MEN WHO DISCOVERED THIS IDEA. Who were Louis Pasteur and Edward Jenner and what was their contribution to immunization? Explain their discoveries and the diseases they worked with. Be sure to include how a vaccine (immunization) works.

Group 4:

YOUR TOPIC IS THE HISTORY OF DISEASE. HOW DID PEOPLE EXPLAIN GETTING SICK 100 YEARS AGO? HOW DO WE EXPLAIN IT TODAY? Explain early (old fashioned) ideas about how diseases were caused? How did the introduction of the "GERM THEORY" by Louis Pasteur and others change things? Be sure to teach us about some of the famous scientists who started the science of "germs" and "microbes".

Group 5:

YOUR TOPIC IS ALEXANDER FLEMING AND PENICILLIN. What is Sir Alexander Fleming's contribution to microbiology? Be sure to tell us his story and why it took so long to turn his discovery into a cure.

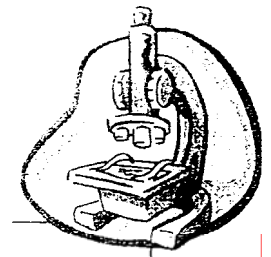
Group 6:

YOUR TOPIC IS ANTIBIOTICS. What can you teach us about how antibiotics kill bacteria? How do they damage bacterial cells and not ours? Currently many bacteria are becoming resistant to antibiotics. Why is this happening? What can be done about this problem?

Group 7:

YOUR TOPIC IS PUBLIC HEALTH AND HOW IT HAS CHANGED. Explain how the work of Robert Koch, Joseph Lister and others lead to changes in surgery, infection during childbirth and changes in sanitation for cities and hospitals.

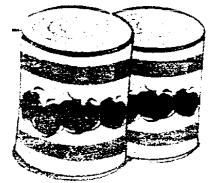
Mini-Research Project



Objective: Groups of 3-4 students will research a topic involving “Microbiology and Human Health”. Students will learn to use INSPIRE and other resources to create a list of 10 key facts, a bibliography, a visual aid, and an oral presentation to their class.

Record your TOPIC and questions here: _____

- ❖ You will work as a **TEAM** to research this topic.
- ❖ You will create a list of **10 key facts** concerning your topic.
- ❖ You will create a present a **speech/mini-lesson** to the class (about 5 min. long)
- ❖ You will create **at least one visual aid** to enhance your presentation.
- ❖ You will use a minimum of 2 INSPIRE sources and 2 others; then create a bibliography/works cited.



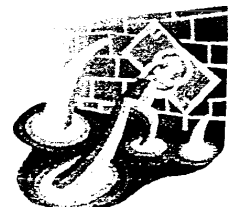
Timeline

Date	
Day 1	_____ Form groups/ begin research
Day 2	_____ Learn to use INSPIRE/ research
Day 3	_____ Research
Day 4	_____ Research
Day 5 *	_____ Class presentations
Day 6	_____ Class presentations

*** 10 facts. Bibliography, visual aid, and speech are due.**

Things to know:

- ❖ You should be able to do all of this in school if you use time wisely.
- ❖ Spread out the workload. Divide up the tasks. **Everyone works!!!**
- ❖ Be sure that all of your names are on the key facts sheet.
- ❖ Be sure that you answer all of the questions you have been asked.
- ❖ Your visual may be pictures on PowerPoint, pictures in a book displayed with the flex-cam, overhead transparencies, food, or other objects,
- ❖ If your visual is PowerPoint, **it MUST be on DISC!!!!**
- ❖ Your bibliography must have at least 4 sources and be in proper form.
- ❖ Practice your presentation!!
- ❖



Name_____

Topic_____

Organizational QUAD Sheet

TOPIC QUESTION:	ANSWER AND DETAILS:
RESOURCES:	
BOOK: Author: _____ Title: _____ Place of Pub.: _____ Publisher: _____ Copyright Date: _____	
ENCYCLOPEDIA: Article author: _____ Article title: _____ Encyclopedia: _____ Edition date: _____	
PERIODICAL: (from INSPIRE) Article author: _____ Article title: _____ Magazine: _____ Issue date: _____ Pages: _____	
INTERNET SOURCE: Author (if known): _____ Title: _____ Date of your visit: _____ URL: http:// _____ _____ _____	

Searching INSPIRE

Steps to Search the INSPIRE databases:

1. I type INSPIRE's URL address: **http://www.inspire.net**
2. I scroll down to Start Here -Search INSPIRE Now!click GO
1. I choose: _____
2. I go to the lower left column and choose: Pick a Database
5. I choose the following databases for this project:

_____	_____
_____	_____
_____	_____
6. I type in my KEY TERMS or search terms.
7. I choose an article that is FULL TEXT (or has the HTML picture to get the full text article.
8. I will "click" on the blue title and read the summary to see if the article fits my needs.
9. If it is something I can use, I will "click" on the HTML picture to get the full text article.
10. To email the article to myself, I first "click" SAVE, then "click" email.
11. OR "copy/paste" it into Word including the address bar. I highlight the facts I will use then, print, or take notes on them.

Understanding the Basics of Boolean Connectors

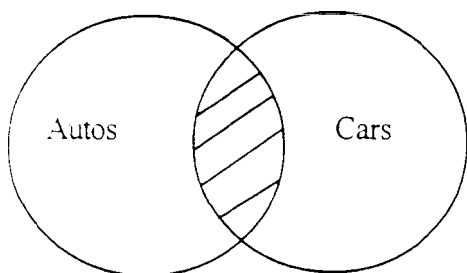
AND: Use this connector to narrow a search that resulted in too many articles by adding an additional term to your original search. To use: Type the additional term on a line in the Search dialog box beginning with AND or type the word AND between your search terms, or select AND from the options available. The search engine will now search the database for articles which contain both search terms.(EXAMPLE: food **and** preservation **and** history)

OR: Use this connector to broaden a search that found too few articles by searching for synonyms of your original term or other forms of your term . To use: Type the word OR between your search terms on a single line of the Search dialog box, or select OR from the options available.
(EXAMPLES: virus **or** viruses; germs **or** virus)

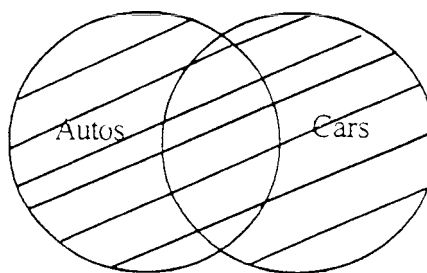
NOT: Use this connector to narrow a search that found too many articles by specifying a word to exclude from your search. To use: Type the term to exclude on the line in the Search dialog box beginning BUT NOT. Or, type the word NOT between your search terms, or select NOT from the options available. (EXAMPLE: germ **not** warfare)

EXAMPLES

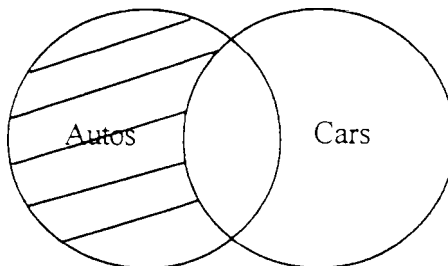
And



Or



Not



Searching Successfully....

1. Choose search terms and narrow to 2/3 keywords.
2. Choose an appropriate database in INSPIRE.
3. Narrow the search to a smaller number of articles by using Boolean search techniques.
4. Skim headlines or titles of sources to choose the "best" articles for you.
5. Copy/paste into Word and print or take notes on the selected articles.
6. Remember to get "Works Cited" information on the articles you use.
7. Refine and focus your information to match your topic.

STUDENT SEARCH ORGANIZER

Before you begin your search for articles in INSPIRE, use your Topic Chooser, Project Planner, any graphic organizers and this page to make your search strategy.

Project name or topic
statement: _____

Essential
Question: _____

Main Topics:

_____	_____
_____	_____
_____	_____

Key Words (synonyms, related terms, people, places, etc.)

_____	_____
_____	_____
_____	_____

The first search term (topic or keyword) that I am going to try:

The articles and sources with the best information on my topic are:

Works Cited

Book (with one author):

Last name, first name of author. Title underlined. City of publication: Publisher, copyright date.

Langhorne, Mary Jo. Developing an Information Literacy Program K-12. New York: Neal-Schuman Publishers, Inc. 1998.

Book (with more than one author):

Last name, first name of first author, then last name, first name of second author. Title of book underlined. Place of publication: Publisher. Copyright date.

Arcellana, Ema, Politzer, Stephen, and Ward, Sandra. Searching the WEB. El Segundo: Classroom Connect, Inc. 1998.

Set of books (like encyclopedias):

Last name, first name of article author (at end of article in World Book). "Article Title." Encyclopedia Name Underlined. Place of publication: Publisher, year of publication. Pages-Used.

Blacklow, Neil R. "Virus." World Book Encyclopedia. Chicago: World Book, Inc., 2001. 426-428.

Citing an INSPIRE resource:

Author of the article's last name, comma, first name. "Title of the article in quotation marks." Name of the magazine underlined. Date of the magazine. Name of the INSPIRE database used underlined. Date you visited INSPIRE.

Blumenthal, D. "The Canning Process." FDA Consumer. Sept.1990. INSPIRE-MAS Ultra-School Ed. 15 Oct. 2001.

Other internet sites:

Author (if known). "Full title of the page you used in quotation marks." Full Title of Homepage (if different) Underlined.
Date of your visit <http address>.

Stein, Bruce A. <<Chinese Tallow.>> America's Least Wanted.
5 Nov. 2000 <[http:// consci.tnc.org/library/pubs/dd/](http://consci.tnc.org/library/pubs/dd/)>.

CD-ROM:

"Title of the article in quotes". Name of the CD-ROM underlined.
CD-ROM. Place of publication: Publisher, Copyright date.

"Australia." World Search. CD-ROM. Auburn, Alabama: World
Search, Inc., 2000.

Remember you MUST have done the following on your Works Cited page:

- ❖ Title: WORKS CITED at the top.
- ❖ Put them in ABC order by the first word or name.
- ❖ Indent the second line (if there is one).
- ❖ Give 4 sources (two from INSPIRE).

Here is a sample Works Cited:

Susie Sunshine
Sam Surly
Period 1

Works Cited

Blacklow, Neil R. "Virus." World Book Encyclopedia. Chicago: World Book, Inc., 2001. 426-428.

Blumenthal, D. "The Canning Process." FDA Consumer. Sept. 1990. INSPIRE-MAS Ultra-School Ed. 15 Oct. 2001.

Schomaker, William. "Scientists Probe Life's Early Days." Astronomy. Nov. 2001. Middle Search Plus. 7 Nov. 2001.

"Virus." Science Encyclopedia. CD-ROM. Austin, Texas: Steck-Vaughn, 1997.

Microbiology and Human Health Rubric

- #1 Food Preservation and microbes
- #2 Viruses
- #3 History of Disease
- #4 Immunizations (vaccines) and the men who discovered this idea
- #5 Alexander Fleming and Penicillin
- #6 Antibiotics
- #7 Public Health and how it has changed



Group # _____
 Date of Presentation _____

Teacher: _____
 Period: _____

	Criteria				Points
	BEGINNING	ALMOST THERE	GOT IT!	AND MORE	
Organization of Oral Report	4 Audience cannot understand presentation because there is no sequence of information.	6 Audience has difficulty following presentation because students jump around	7 Students present information in logical sequence which audience can follow.	8 Students present information in logical; interesting sequence which audience can follow	_____
Content Knowledge of Oral Report	4 Students do not have grasp of information; students cannot answer questions about the subject.	6 Students are uncomfortable with information and are only able to answer rudimentary questions	7 Students are at ease with content, but fail to elaborate.	8 Students demonstrate full knowledge (more than required) with explanation and elaboration	_____
Visual(s)	0 Students used no visuals.	2 Students used visuals that did not support presentation.	3 Visuals related to presentation.	4 Students used visuals to reinforce presentation	_____
Timeline	4 Student's timeline had 4 or more errors.	6 Timeline had 3 errors in spelling/facts/or grammar.	7 Timeline had 2 errors in spelling/facts/ or grammar.	8 Timeline had no errors in spelling/facts/or grammar.	_____
Bibliography	0 Works cited is missing.	5 Has 5 errors in format.	7 Has 2-4 errors.	10 Has 1 or no errors.	_____
TOTAL POSSIBLE POINTS =38					TOTAL